CHAETOPLEURA STAPHYLOPHERA (POLYPLACOPHORA: CHAETOPLEURIDAE), A NEW SPECIES FROM THE SOUTHEASTERN UNITED STATES AND BAHAMAS

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ABSTRACT

Chaetopleura staphylophera *n. sp., from off North Carolina, the Bahamas, and both Florida coasts, differs from other western Atlantic* Chaetopleura *by possession of considerably larger, nonaligned pustules on end valves and lateral areas of intermediate valves, and from the west American* C. gemma *in that pustules of that species are aligned in radial rows. Relegation of* Calloplax *Thiele, 1909, to synonymy with* Chaetopleura *Shuttleworth, 1853, is recommended.*

Investigations of continental shelf fauna of relatively deep waters off Florida and adjacent areas have revealed a previously unknown species of the genus *Chaetopleura* Shuttleworth, 1853, which is here described. Questions regarding generic placement of this and another species prompted review of characters of *Chaetopleura* and of the genus *Calloplax* Thiele, 1909.

Most specimens examined during this study were collected during the Hourglass Cruises off central west Florida (Joyce and Williams, 1969), a survey of rock shrimp off northeast Florida (Kennedy *et al.*, 1977), and a study of the fauna of *Oculina* reefs off central east Florida (Avent *et al.*, 1977; Reed *et al.*, 1982). The first two programs were conducted by the Florida Department of Natural Resources Bureau of Marine Research utilizing the R/V *Hernan Cortez*, and the third was conducted by Harbor Branch Foundation utilizing the submersible *Johnson-Sea-Link* (JSL). Specimens are housed in the U.S. National Museum of Natural History, Smithsonian Institution (USNM), Washington, DC; the Academy of Natural Sciences of Philadelphia (ANSP), Pennsylvania; the American Museum of Natural History (AMNH), New York; the Brevard Museum, Inc. (BMI), Cocoa, Florida; the British Museum (Natural History) (BMNH), London; the California Academy of Sciences (CAS), San Francisco; the Harbor Branch Foundation (HBF; museum prefix IRCZM), Ft. Pierce, Florida; the University of North Carolina Marine Science Institute (UNC), Morehead City; and the Florida Department of Natural Resources Bureau of Marine Research (FDNR; museum prefix FSBC I), St. Petersburg. Because nearly all specimens were curled to some extent, measurements of total length are to the nearest 0.5 mm; individual valve-lengths are measured at the midline.

Chaetopleura staphylophera*, new species*

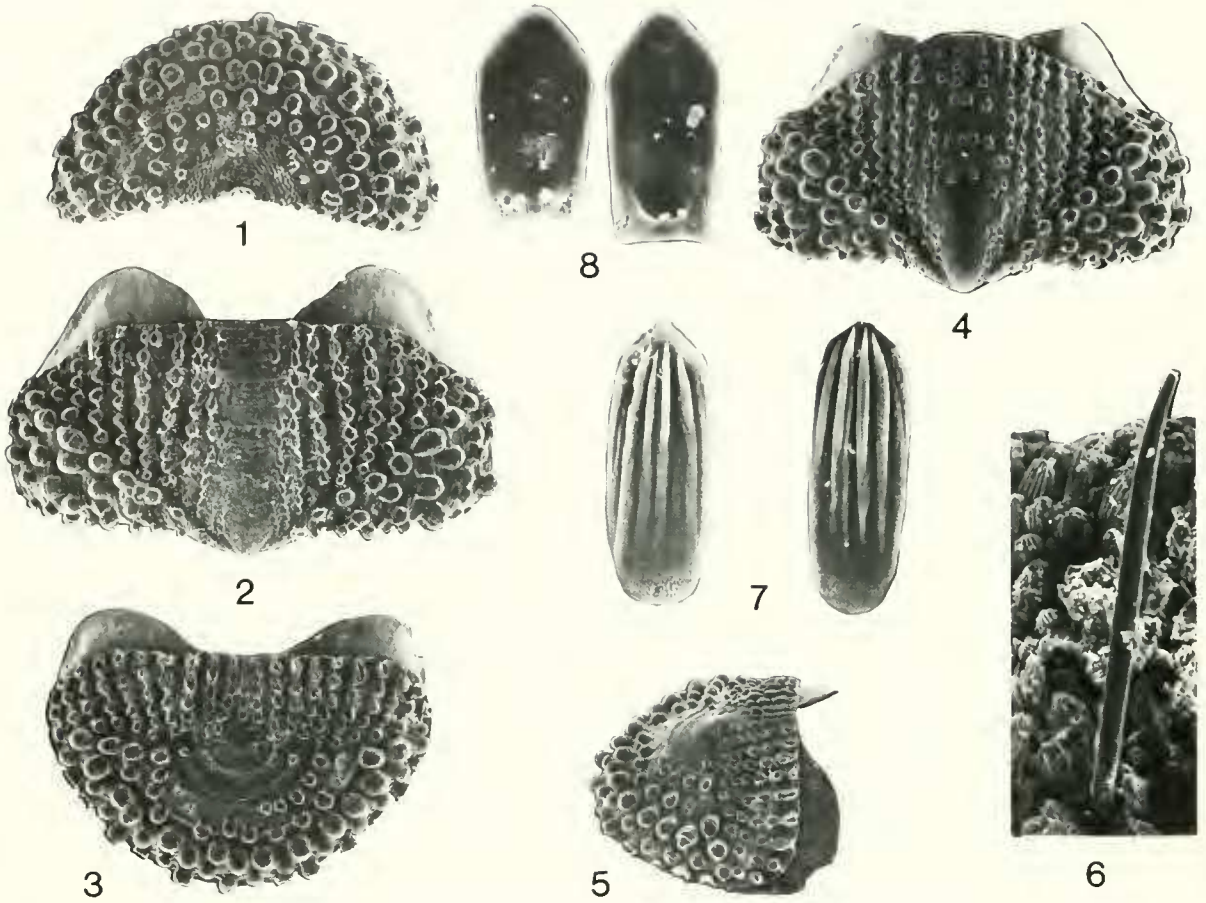
(Figs. 1-14, 28)

?Calloplax janeirensis: Porter, 1974, p. 302 [*non C. janeirensis* (Gray, 1828)].

Chaetopleura sp. Lyons, 1982, p. 39.

Holotype: Length 15.5 mm; Hourglass Station M; 26°24′N, 83°43′W, approximately 92 nmi west of Sanibel Island Light, Florida west coast; 73 m depth; 12 April 1966; USNM 842109.

Other material: FLORIDA: 1 paratype, 15.0 mm; Hourglass Station M; 12 April 1966; FSBC I 31757.– 1 paratype, 17.0 mm; same; 13 November 1966; FSBC I 31759.– 1 paratype, 11.5 mm; Hourglass Station D; 27°37′N, 83°58′W, approximately 65 nmi west of Egmont Key; 55 m; 4 April 1967; FSBC I 31758.– 1 paratype, dried, curled; *Eolis* Station 104; off Fowey Light; 91 m; J. B. Henderson, coll.; USNM 454682.– 1 paratype, 21.0 mm; 27°13.1′N, 79°58.7′W, 9 nmi ENE of St. Lucie Inlet; 64 m; 14 April 1973; FSBC I 31760.– 2 paratypes, 11.0, 15.0 mm; JSL Station 2122A; 27°32.8′N, 79°58.8′W, east of Ft. Pierce; 77.4 m; 20 September 1976; IRCZM 61:060.– 2 paratypes, 6.0, 8.5 mm; JSL Station 2125A; same



FIGS. 1-8. **1-6,** *Chaetopleura staphylophera* n. sp., paratype, 15.0 mm; west of Sanibel Island, Florida, 73 m; FSBC I 31757: 1, valve I; 2, valve IV; 3, valve VIII; 4, valve II; 5, valve VIII, lateral view (all × 15); 6, girdle spicule (× 220); **7,** *C. staphylophera*, paratype, 16.0 mm; 23.5 nmi east of Port Canaveral, Florida, 73 m; FSBC I 31761; dorsal girdle scales (× 515); **8,** same; ventral girdle scales (× 550).

coordinates; 77.7 m; 21 September 1976; IRCZM 61:061.– 4 paratypes, 1.5-8.5 mm; JSL Station 2160A; same coordinates; 73.8 m; 2 February 1977; IRCZM 61:062.– 1 paratype, 7.0 mm; JSL Station 2163A; same coordinates; 80 m; 7 February 1977; IRCZM 61:063.– 1 paratype, 1.8 mm; JSL Station 2163B; same coordinates, depth, and date; IRCZM 61:064.– 1 paratype, 16.0 mm; [?] 28°02′N, 80°26′W, 8 nmi east of Grant; 18 m; 6 June 1978; BMI 1143.– 2 paratypes, 9.0, 10.0 mm; 28°02.8′N, 79°58.0′W, 31.5 nmi SE of Port Canaveral; 73 m; 22 May 1973; ANSP A-10629.– 1 paratype, 12.0 mm; 28°10′N, 80°03′W, 30 nmi ENE of Melbourne; 53 m; September 1981; AMNH 213570.– 2 paratypes, 6.5, 16.0 mm; 28°18.9′N, 79°59.1′W, 23.5 nmi east of Port Canaveral; 73 m; 19 June 1973; FSBC I 31761.– 1 paratype, 13.5 mm; 28°35′N, 80°07′W, 24 nmi ENE of Cape Canaveral; 61 m; July 1982; BM(NH) 1985007.– 1 paratype, 9.5 mm; 28°37.1′N, 80°04.8′W, 25 nmi ENE of Cape Canaveral; 61 m; 14 August 1973; CAS 056545.– 1 paratype, 18.0 mm; 28°41′-40′N, 80°03′W, 28 mi ENE of Cape Canaveral; 86-91 m; 23 April 1983; FSBC I 30775.– 1 paratype, 13.0 mm; 30°00′N, 80°15′W, 54 nmi ENE of St. Augustine; 73.1-82.2 m; 24 June 1982; FSBC I 30771. NORTH CAROLINA: 1 paratype, 14.5 mm; *Eastward* Station 480; 34°12′N, 76°05.9′W, SE of Cape Lookout; 73-107 m; 18 March 1969; UNC 4302.1– GRAND BAHAMA ISLAND: 1 tail valve (viii), 7.3 mm wide, 4.2 mm long; Gold Rock; 24.4 m; J. N. Worsfold, coll.; July 1981;

FSBC I 31762.– 1 tail valve (viii), 7.0 mm wide, 3.8 mm long; Tamarind Beach Reef; 46.8 m; Worsfold collection.– 1 intermediate valve, 7.2 mm wide, 3.1 mm long at jugum; Gold Rock; 26.2 m; Worsfold collection.– 1 intermediate valve, 9.9 mm wide, 4.5 mm long at jugum; Indian Cay; 23.0 m; Worsfold collection.

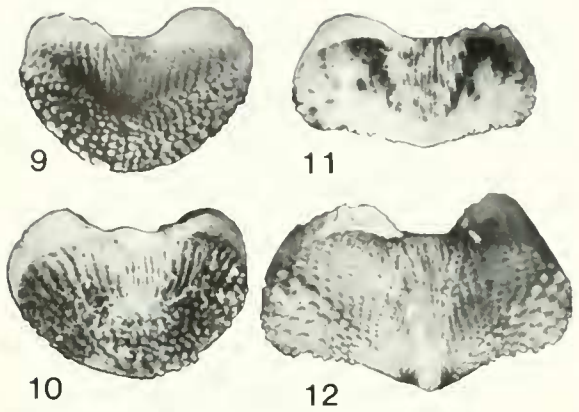
Description: Largest entire specimen 21.0 mm long, 9.5 mm wide, including girdle. Some paratypes bright orange; holotype and other paratypes yellow or beige with white stripe on jugum; stripe sometimes overlain with orange, anteriorly directed, slender triangle; or, in addition, with dark brown in central areas of valves ii, iv, v, vii, and viii. Tegmentum ornamented with rounded, large pustules (to 300 μm diameter) and linearly aligned, usually small (to 150 μm diameter) pustules. Width of tegmentum of valves of undissected holotype: i = 3.6; ii = 4.1; iii = 4.5; iv = 4.6; v = 4.8; vi = 4.9; vii = 4.5; viii = 3.6 mm. Head valve (i) ornamentation beginning as radial rows of 3 or 4 small pustules at apex, thereafter losing alignment but closely situated, increasing in size toward margin, resulting in vaguely concentric arcs of pustules of similar size. Lateral areas of intermediate valves (ii-vii) with about 30-50 large pustules, seldom if ever connected, those at anterior margins aligned in transverse rows, others scattered, all closely packed, increasing in size toward anterolateral corners; central areas with as many as 19 or 20 subparallel, occasionally converging, longitudinal rows of small pustules (8-9 rows on holotype); pustules of rows increasing in size and decreasing in numbers toward lateral margins; as many as 20 small pustules in rows near jugum; rows usually continuing over jugum of valves ii and vii, sometimes absent or interrupted at jugum of valves iii-vi; posterior edges of intermediate valves straight in larger specimens, slightly beaked in smaller specimens, all slightly peaked (subcarinate) at center. Tail valve (viii) with mucro slightly elevated, a little anterior of center, thereafter dropping away concavely for a short distance and then sloping gently to posterior margin; jugum and central areas with parallel rows of small pustules; remainder of valve with large, densely packed pustules arranged in concentric rows of pustules of similar size, largest at margin.

Articulamentum white, with light brown or orange hues evident through strongly excavate surfaces beneath lateral areas, somewhat less evident beneath central areas, occasionally with an orange, longitudinal stripe beneath jugum. Insertion teeth well defined, relatively sharp, thickened near slit; slit formula 11-1-8. Sutural laminae relatively short, broadly rounded anteriorly; sinus well defined; on valve viii of 16.0 mm specimen, width of sinus 0.9 mm, width of sutural laminae 2.4 mm; ratio (relative width of sinus) 0.375. Eaves solid.

Girdle upper surface paved with small (about 70-75 × 20-35 μm), ovoid, elongate scales, coarsely striated toward sometimes pointed distal tips, interspersed with a few glassy spicules up to 350 μm long; girdle outer margin fringed with glassy spicules of two types, the first slender, blade-like (30 × 210 μm), the other very slender and small (8-10 × 55-80 μm); undersurface paved with rectangular, transparent scales about 25 × 50-100 μm, each bearing an outer edge protuberance that articulates with inner edge concavity of adjacent scale; girdle bridges packed with slender, blade-like spicules (10 × 115 μm).

Radula of 16.0 mm specimen 5.0 mm long (31% of total specimen length), with 48 rows of mature teeth; median tooth broadly rectangular, about 90 μm wide at anterior blade; major lateral teeth with tricuspid head 120 μm long, 80 μm wide.

Variation: The 27 intact specimens range in length between 1.5 and approximately 21.0 mm. No pustules are present on two specimens 1.5 and 1.8 mm in length, but a 2.2 mm specimen (IRCZM 61:062) has single large pustules at anterolateral corners of each intermediate valve, indicating that tegmental ornamentation may begin at about that size. Thereafter, large pustules of all valves apparently increase in size and number with increasing size of the animal. The largest specimen (21.0 mm; FSBC I 31760; Fig. 14) is severely eroded on all valves, particularly at the junctions of lateral and central areas of the intermediate valves. The rows of small pustules of central areas extend over the jugum of all valves except iv, which remains smooth on the posterior half; indications of 19-20 pustule rows are present on some valves. In lateral areas of the 21.0 mm specimen, largest pustules tend to occur near the middle, and pustules nearest the girdle are somewhat



FIGS. 9-12. Single valves of *Chaetopleura staphylophera* n. sp. from sediments, Grand Bahama Island (all × 3.5): **9**, valve VIII; Gold Rock, 24.4 m; FSBC I 31762; **10**, valve VIII, Tamarind Beach reef, 46.8 m; **11**, intermediate valve; Gold Rock, 26.2 m; **12**, intermediate valve; Indian Cay, 23.0 m. [Figured specimens 10-12 in Worsfold collection].

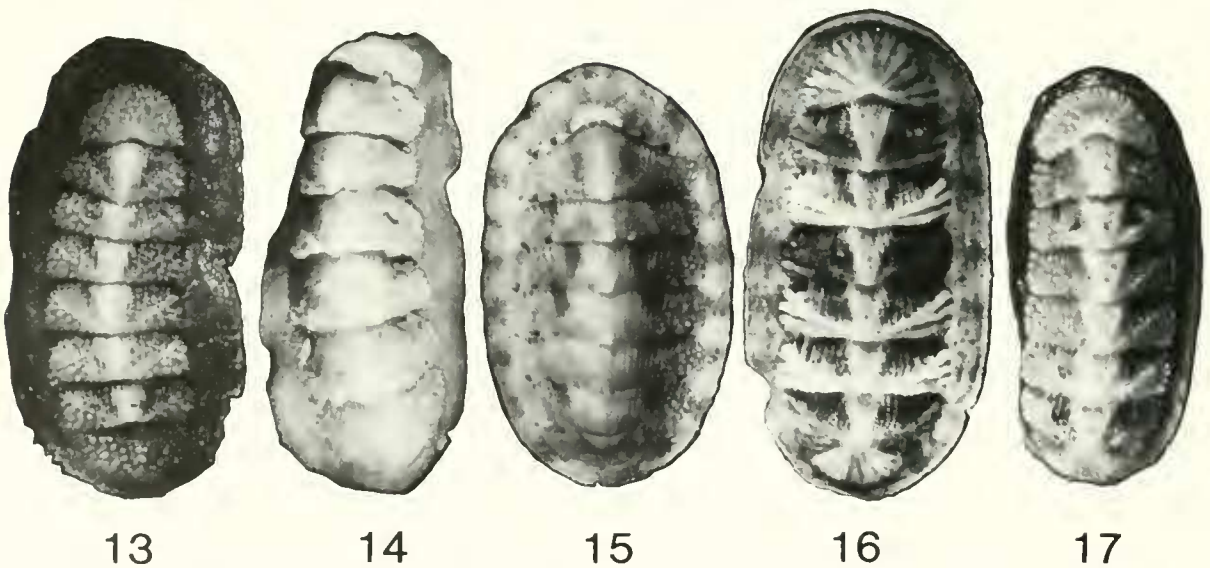
smaller and arranged in rough, concentric arcs, giving the impression of less energetic growth with advanced age.

The Bahamian specimens consist only of single valves (Figs. 9-12), but their tegmental pustular arrangements are similar to those of specimens from North Carolina and Florida. If, as seems likely, the Bahamian specimens represent the new species, this may indicate that the species attains greater size than exhibited by the largest (21.0 mm) entire specimen; width of the tegmentum of valve viii of that specimen is only 5.2 mm, whereas that of the largest Bahamian specimen is 7.3 mm.

Distribution: Intact specimens of *Chaetopleura staphylophera* were examined from off Tampa Bay and Sanibel Island, Florida west coast; off Fowey Light near Miami; offshore of St. Lucie Inlet northward to St. Augustine along the Florida east coast; and southeast of Cape Lookout, North Carolina. Because all other Florida specimens were taken from depths of 53-91 m, the single record from 18 m (BMI 1143) is questioned. The North Carolina collection is from "240-350 ft" (=73-107 m), so that specimen may have occurred within the depth range of the Florida material or in slightly greater depths. All Bahamian specimens are from off the southwest coast of Grand Bahama Island and consist only of single valves collected by divers from sediments near reefs in 23-47 m depths, somewhat shallower than the continental collections.

Etymology: The specific name *staphylophera*, from the Greek *staphyle* (a bunch or cluster of grapes) and *phero* (to bear or carry), refers to the distinctive clusters of large, grape-like pustules on lateral areas of intermediate valves.

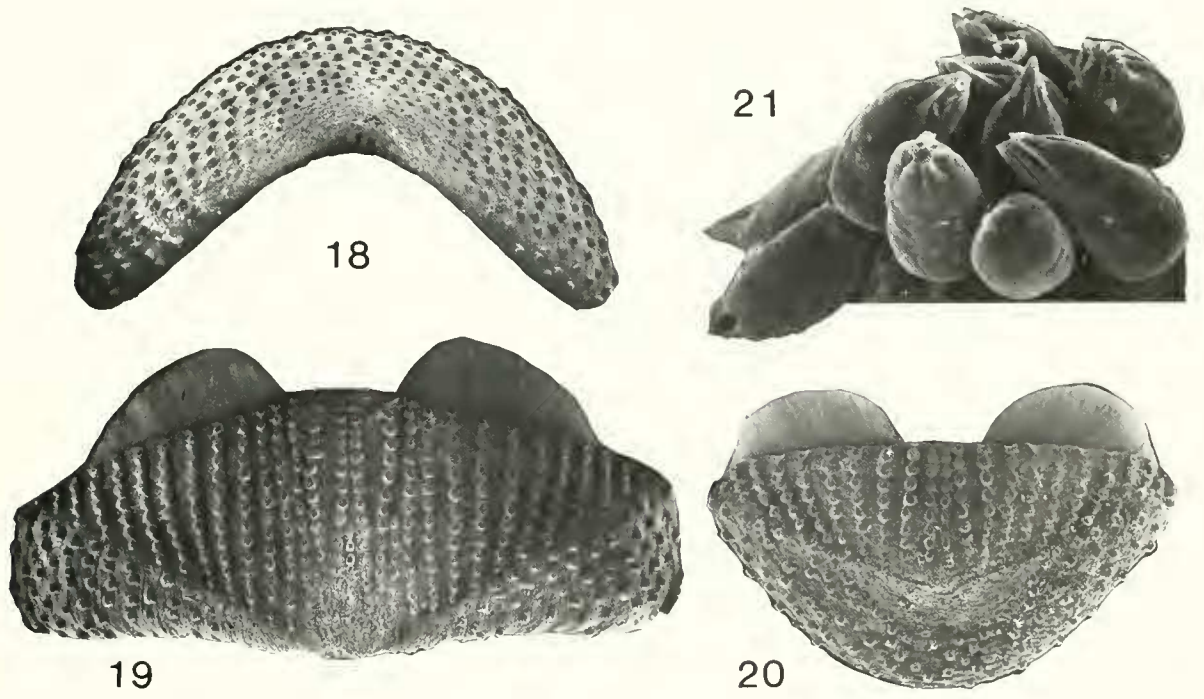
Remarks: Porter (1974: p. 302) listed the



FIGS. 13-17. **13**, *Chaetopleura staphylophera* n. sp., holotype, 15.5 mm; west of Sanibel Island, Florida, 73m; USNM 842109. **14**, *C. staphylophera*, paratype, 21.0 mm; 9 nmi ENE of St. Lucie Inlet, Florida, 64 m; FSBC I 31760; **15**, *Chaetopleura apiculata* (Say), 12.4 mm; east of Hutchinson Island, Florida, 91.5 m; FSBC I 30767; **16**, *"Callochiton" janeirensis* (Gray), 18.0 mm; Sand Key reef, Florida, 1 m; FSBC I 31765; **17**, *"C." janeirensis*, 16.0 mm; Rio de Janeiro, Brazil, shallow; FSBC I 31768.

North Carolina specimen as *?Calloplax janeirensis*, and Lyons (1982: p. 39) mentioned an undescribed species of *Chaetopleura* from the Bahamas. Both reports were based upon specimens used in this study and which are herein described.

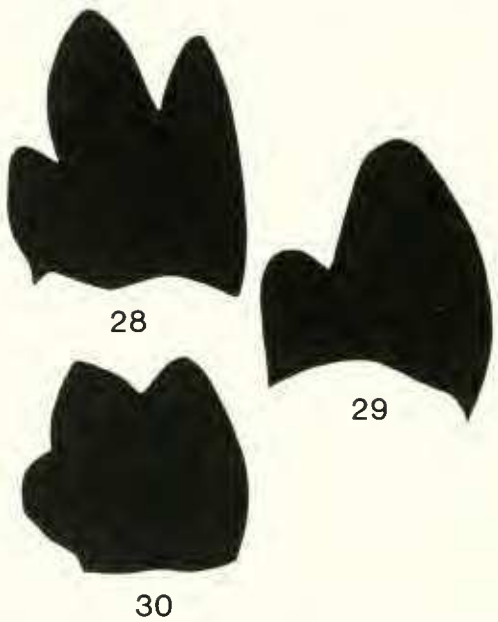
The new species differs from *Chaetopleura apiculata* (Say, 1834), the only previously known *Chaetopleura* species from the eastern and southern United States, by possession of much larger, more densely arrayed pustules on the end valves and on lateral areas of intermediate valves (Figs. 18-20). Additionally, the major lateral tooth of the radula of *C. apiculata* is bicuspid (Fig. 29), whereas that of the new species is tricuspid (Fig. 28). In areas where the ranges of the two species overlap latitudinally, *C. apiculata* usually (but not always) occupies shallower depths than does *C. staphylophera*. Other western Atlantic species of *Chaetopleura* are known only from the southern Caribbean or further south. These include *C. candisata* Shuttleworth, 1856 (=*C. apiculata*, *fide* Kaas, 1972; Kaas and Van Belle, 1980; Ferreira, 1983a), from Guadeloupe, and *C. angulata* (Spengler, 1797), *C. isabellei* (d'Orbigny, 1841), and *C. spinulosa* (Gray, 1828), all from Brazil or southward to Patagonia. Published descriptions of the last three species indicate that all possess tegmental pustules considerably smaller and more widely spaced than those of the new species. *Chaetopleura carrua* Righi, 1970, entirely lacks pustules on end valves and lateral areas of intermediate valves. Instead, *Chaetopleura staphylophera* demonstrates a close relationship to *Chaetopleura gemma* Dall, 1879, a west American species which occurs from Vancouver Island, Canada, to Magdalena Bay, Baja, California (Burghardt and Burghardt, 1969; Putnam, 1980). That species lives in depths of 10-40 fms (18-73 m) or more according to Clark (1982), but Ferreira (1983a) reports the bathymetric range as 0-22 m; the reason for this discrepancy is unknown. Like the new species, the major lateral tooth of the radula of *C. gemma* is tricuspid (Dall, 1879: 296, pl. 1, fig. 9). Tegmentum color, size and shape of pustules, and slit formula (9-12/1/7-8) of *C. gemma* are also similar to those of *C. staphylophera*, but pustules of the lateral areas of *C. gemma* are arranged in 4-7 radiating rows (Pilsbry, 1892; Ferreira, 1983a), whereas those of *C. staphylophera* are not



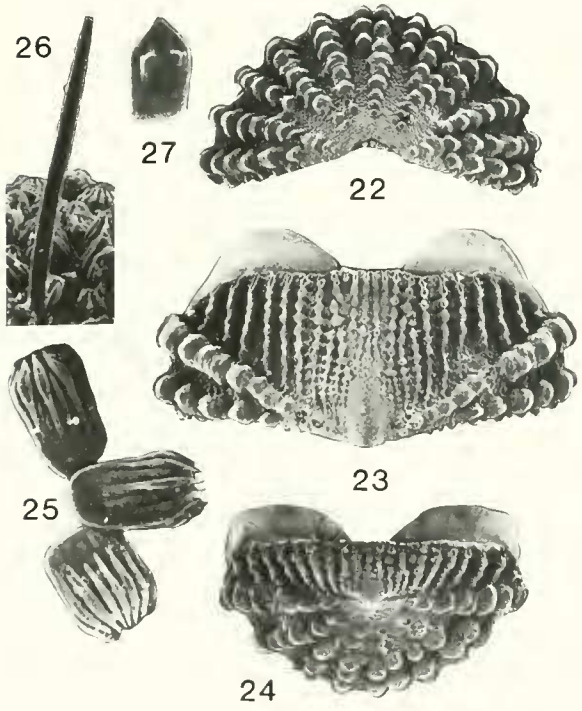
FIGS. 18-21. *Chaetopleura apiculata* (Say), 11.0 mm; Anclote Key, Florida, 3 m; FSBC I 31764: **18**, valve I; **19**, valve IV; **20**, valve VIII (all × 16); **21**, dorsal girdle scales (× 600).

aligned except at anterior margins. Likewise, there are 10-15 longitudinal rows of pustules on central areas of *C. gemma* (*fide* Ferreira, 1983a), whereas *C. staphylophera* has as many as 20 such rows. The tail valve of *C. gemma* illustrated by Pilsbry (1892: pl. 13, fig. 74) also differs from that of *C. staphylophera*, being ornamented with many radial rows of numerous beads rather than the essentially nonaligned pustules of the new species.

Chaetopleura staphylophera is distinguished from *Calloplax janeirensis* [also = *Chiton souverbiana* Reeve, 1847, formerly considered a species of *Chaetopleura*, *fide* Ferreira (1979)], the only other species of Chaetopleuridae in Florida and the northern Caribbean, by possession in the latter of strong radial ribs (Fig. 16) or rows of loosely coalesced pustules (Figs. 17, 22-24) instead of unaligned pustules on end valves and lateral areas of intermediate valves. However, the new species resembles *C. janeirensis* in the size and shape of pustules, in the pebbly surface of the interpustular tegmentum of head and tail valves (Figs. 1, 3, 22, 24), and in morphology of scales (Figs. 7, 8, 25, 26) and scattered glassy spicules (Figs. 6, 27) of the dorsal surface of the girdle. Both species also possess radulae with tricuspid major lateral teeth, but cusps are much longer and more acute on teeth of *C. staphylophera* than are those of *C. janeirensis* (Fig. 30).



FIGS. 28-30. Major lateral radular teeth: **28**, *Chaetopleura staphylophera* n. sp. (× 450); **29**, *Chaetopleura apiculata* (× 400); **30**, *"Calloplax" janeirensis* (× 500).



FIGS. 22-27. **22-25**, *"Calloplax" janeirensis* (Gray), 10.5 mm; Dry Tortugas, Florida, 1 m; FSBC I 31767: **22**, valve I; **23**, valve IV; **24**, valve VIII (all × 12); **25**, dorsal girdle scales (× 300); **26**, *"C." janeirensis*, 15.5 mm; Key Vaca, 1 m; FSBC I 31766; girdle spicule (× 200); **27**, *"C." janeirensis*, 14.5 mm; Key Vaca, Florida, 1 m; FSBC I 31766; ventral girdle scale (× 300).

Ferreira's statement (1983a: p. 220) that *Chaetopleura gemma* "poses no diagnostic problems [as a species of *Chaetopleura*] given its very different characteristics in shape, size and sculpture [including "tubercular ridges" on lateral areas]" is perplexing because that species, like *C. staphylophera*, also strongly resembles *Calloplax janeirensis*. Efforts to clarify the generic affinities of these species prompted a review of recent treatments of both genera.

Thiele (1909) erected *Calloplax* to contain *Chiton janeirensis* Gray, 1828, which occurs from Brazil to south Florida. Assigned to *Chaetopleura* Shuttleworth, 1853, by several authors during the latter half of the nineteenth century, *C. janeirensis* was separated from that genus by Thiele because the pustules of the head, tail, and lateral areas of intermediate valves are much

larger than those of species of *Chaetopleura* and are usually coalesced to form prominent ribs. *Calloplax* was placed in Chaetopleuridae by Thiele (1929) where it remained until recently. No additional species were described until A. G. Smith and Ferreira (1977) reassigned the endemic Galapagos species *Callistochiton duncanus* Dall, 1919, to *Calloplax*, thereby establishing the presence of the genus in the eastern Pacific; Smith and Ferreira concurrently reassigned *Calloplax* to Callistoplacidae. Soon thereafter, Ferriera (1978) transferred a Chilean species, *Callistochiton viviparus* Plate, 1899, to *Calloplax*, redescribed *C. janeirensis* and *C. duncanus*, reviewed synonymies of all three and retained *Calloplax* in Callistoplacidae. More recently, Ferreira (1982) described a third eastern Pacific species, *Calloplax hanselmani*, from Peru and the Galapagos Islands northward to Mexico. In that paper, Ferreira expressed uncertainty regarding the taxonomic position of *Calloplax* and, after assessing similarities between *Calloplax*, *Chaetopleura* and *Callistochiton*, concluded that *Calloplax* should be returned to Chaetopleuridae.

Although Ferreira (1978, 1982) twice provided diagnostic comments for *Calloplax* and most recently (1983a) provided similar comments for *Chaetopleura*, he did not define characters separating species of the two genera. Difficulty in identifying differences between the genera has been complicated by unequal application of diagnostic characters. Thus, Ferreira's (1982) diagnosis of *Calloplax* mentions overall shape, tegmental ornamentation, location and configuration of the mucro, and girdle ornamentation, whereas his (1983a) diagnosis of *Chaetopleura* includes comments on size, tegmental ornamentation, insertion plates, slits of intermediate valves, eaves, girdle ornamentation, gills, and radular morphology. To allow more equitable comparison of the two genera, information on the above characters and on girdle bridges (see Ferreira, 1983a) was compiled from species descriptions as well as diagnoses in each of Ferreira's three papers (Table 1).

Information in Table 1 reveals that although some species of *Chaetopleura* have features (e.g., small pustules on head and tail valves and lateral areas of intermediate valves; girdle hairs; bicuspid major lateral tooth) not found on any species of *Calloplax*, all features except the radial ribs of some species of *Calloplax* are fully contained within the range of characters of *Chaetopleura*. In fact, *Calloplax hanselmani* has radial rows of unconnected pustules, not ribs, in areas where ribs customarily occur on species assigned to *Calloplax*, and even ribs of *C. janei-*

TABLE 1. Diagnostic Characters in Recent Reviews[1] of *Chaetopleura* and *Calloplax*.

Character	*Chaetopleura*	*Calloplax*
Size[2]	Small to large (8-60 mm length).	Small to medium (13-21 mm length).
Shape	Ovate (length/width ratio 1.4-1.8:1).	Elongate (length/width ratio ca. 2:1).
Tegmentum	Larger pustules in quincunx or radial rows in end valves and lateral areas of intermediate valves; smaller pustules in longitudinal rows or coalesced in riblets in central areas.	Strong radial ribs or rows of pustules in end valves and lateral areas of intermediate valves; longitudinal, often granulose riblets in central areas.
Insertion plates	With "rather sharp" teeth.	With "*Callistochiton*-like" to "relatively sharp" teeth.
Intermediate valves	Uni-slit.	Uni-slit.
Eaves	Solid.	Solid.
Mucro	Posterior, central or slightly anterior, with concave or convex postmucro, with or without additional false mucro.	Central or slightly anterior, with convex postmucro.
Girdle	With minute, simple, oval to spiculoid scales, interspersed with glassy, hyaline spicules; some species with horny hairs.	With spicules (not hairs) interspersed amidst small, ovoid, closely packed, coarsely striated scales.
Girdle bridges	With or without spicular elements.	With or without spicular elements.
Gills	Holobranchial, abanal.	[Not defined].
Radula	Median tooth wide, subquadrangular; major lateral teeth tricuspid or bicuspid.	Median tooth wide, subquadrangular; major lateral teeth tricuspid.

[1]From Ferreira (1978, 1982, 1983a)
[2]Ranges based on largest reported sizes of various species.

rensis occur as rows of loosely connected pustules in some specimens from Florida (Figs. 22-24) and Rio de Janeiro (Fig. 17), the type-locality of the type-species of *Calloplax*. This seems to eliminate the value of radial ribs as a generic character and requires the conclusion that *Calloplax* is a junior synonym of *Chaetopleura*.

A brief review based upon morphological information available in published literature (Pilsbry, 1892; Thiele, 1893; Plate, 1899; Righi, 1967, 1970; Bullock, 1972; Ferreira, 1978, 1982, 1983a) suggests that most of the 22 New World species of Chaetopleuridae are separable into two groups as defined by Pilsbry (1892: p. 28): "(1) typical forms, rather large, and having very delicate sculpture; and (2) group of *C. gemma*, having the lateral areas strongly raised and coarsely sculptured." These groups approximate those previously allotted to *Chaetopleura* and *Calloplax*, but some "intermediate" species do not conform fully to either group (Table 2).

The first group is comprised of species with bicuspid lateral radular teeth, corneous girdle hairs in addition to scales and glassy spicules, and small tegmental pustules widely scattered or separated in rows. This group includes *Chaetopleura angulata* (Spengler, 1797), *C. apiculata* (Say, 1834), *C. asperrima* (Gould, 1852), *C. hennahi* (Gray, 1828), *C. iquiquensis* (Plate, 1899) and *C. peruviana* (Lamarck, 1819). Radulae of *C. benaventei* Plate, 1899, and *C. fernandensis* Plate, 1899, have not been described, but these species closely resemble *C. peruviana* and *C. iquiquensis*, respectively, in other characters (see Ferreira, 1983a: p. 221), so they also may belong to this group. Ferreira (1983a) implied that *C. unilineata* Leloup, 1954, lacks girdle hairs, but a photograph (his fig. 28) seems to show scattered hairs on the girdle of that species; if present, they would place *C. unilineata* in this group as well. I am unable to ascertain whether *C. isabellei* (d'Orbigny, 1841) or *C.*

TABLE 2. Groupings of New World *Chaetopleura* species, based upon features of the girdle, radula and tegmentum.

Species	Tegmental pustules absent	Lateral radular bicuspid tooth	Girdle hairs present	Tegmental pustules small	Lateral radular tricuspid tooth	Girdle hairs absent	Tegmental pustules "intermediate"	Tegmental pustules large	Tegmental pustules fused, 2 solid ribs
C. carrua	x	x	?						
C. angulata		x	x	x					
C. apiculata		x	x	x					
C. asperrima		x	x	x					
C. hennahi		x	x	x					
C. iquiquensis		x	x	x					
C. peruviana		x	x	x					
C. benaventei		?	x	x					
C. fernandensis		?	x	x					
C. isabellei		x	?	x					
C. spinulosa		x	?	x					
C. unilineata		x	?	x					
C. scabricula			x	x	x				
C. lanuginosa				x	x	x			
C. roddae					x	x	x		
C. shyana					x	x	x		
C. gemma					x	x		x	
C. hanselmani					x	x		x	
C. jancirensis					x	x		x	
C. staphylophora					x	x		x	
C. duncana					x	x			x
C. excipara					x	x			x

spinulosa (Gray, 1828) have girdle hairs; if so, those species also belong here. The type-species of *Chaetopleura* is *Chiton peruvianus* Lamarck [subsequent designation, Dall (1879)], so species in this group would best typify *Chaetopleura s.s.*

Although central areas of its intermediate valves bear rows of tiny, coalesced pustules, *Chaetopleura carrua* Righi, 1970, entirely lacks tegmental pustules on head and tail valves and on lateral areas of intermediate valves. In this regard, *C. carrua* resembles *C. angulata*, a species in which tegmental pustules may be nearly obsolete. Its bicuspid radula appears to ally *C. carrua* with the above group.

Chaetopleura scabricula (Sowerby, 1832) also resembles species in the above group by having small tegmental pustules and distinct girdle hairs but differs by having tricuspid lateral teeth. *Chaetopleura lanuginosa* (Dall, 1879) likewise resembles species in the first group by having small, scattered tubercles but lacks girdle hairs and has tricuspid lateral teeth.

Chaetopleura roddae Ferreira, 1983, and *C. shyana* Ferreira, 1983, each lack girdle hairs, have tricuspid lateral teeth, and have densely packed unaligned tegmental pustules on head and tail valves and lateral areas of intermediate valves. Although relatively smaller than pustules on species in the following group, densities and arrangements of these pustules are suggestive of some species in that group.

The next group includes *C. janeirensis*, the type-species of *Calloplax*. In addition, *Chaetopleura gemma* Dall, 1879, *C. staphylophera*, n. sp., and *C. hanselmani* (Ferreira, 1982) all lack girdle hairs, have tricuspid lateral teeth, and have large tegmental pustules on the head and tail valves and lateral areas of intermediate valves. Pustules may be unaligned (*C. staphylophera*) or arranged in rows (*C. gemma, C. hanselmani, C. janeirensis*) which sometimes in *C. janeirensis* coalesce into radial ribs; two or more such ribs may occur on lateral areas of intermediate valves. Girdle scales and spicules of species in this group resemble those of other species in the group moreso than they resemble those of any other *Chaetopleura* species (for example, see *C. apiculata*, Fig. 21).

Chaetopleura duncana (Dall, 1919) and *C. vivipara* (Plate, 1899) pose additional problems in placement. Each lacks girdle hairs, has tricuspid lateral teeth, has strong radial ribs on head and tail valves, and has only two such ribs on lateral areas of intermediate valves. The low, conical or dome-like girdle scales of these species as illustrated by Ferreira (1978) are dissimilar from any other species of Chaetopleuridae.

Additionally, there are at least three species of *Chaetopleura* in South Africa, possibly two in west Africa, one in east Africa, and one in east Asia (Ferreira, 1983a, b). Insufficient information is available to determine where most of these fit in the above arrangement.

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Conchologists of America

The annual meeting of the Conchologists of America will be held in Philadelphia June 22-26, 1985, where it will be hosted by the Philadelphia Shell Club at the Academy of Natural Sciences of Philadelphia and a nearby hotel. For reservation forms write: Frank Roach, 1028 Belvoir Rd., Norristown, PA 19401.

1985 AMU Meeting

The American Malacological Union will hold its annual meeting on the campus of the University of Rhode Island on July 29-August 3, 1985. For further information please contact Dr. M. R. Carriker, College of Marine Studies, University of Delaware, Lewes, DE 19958.